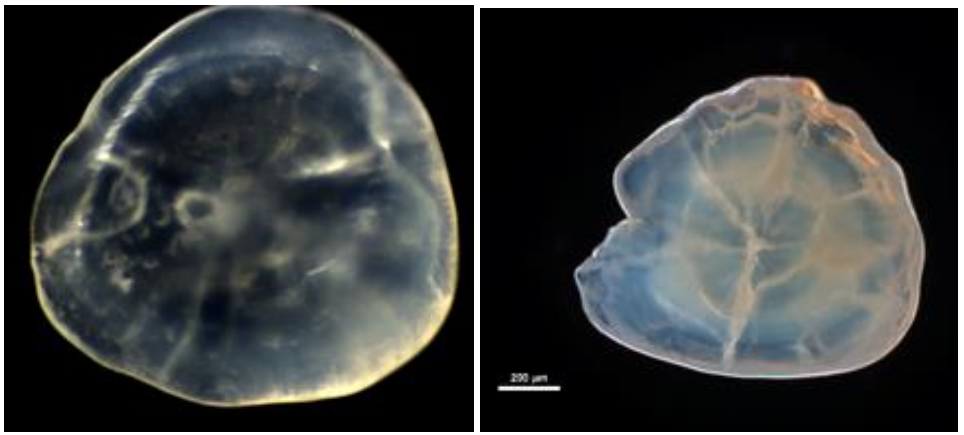
Dune Lake Galaxias Otolith Research

Photo source: M. Pingram

Tanya Cook
NorthTec, Whangarei
tcook@northtec.ac.nz

Otoliths

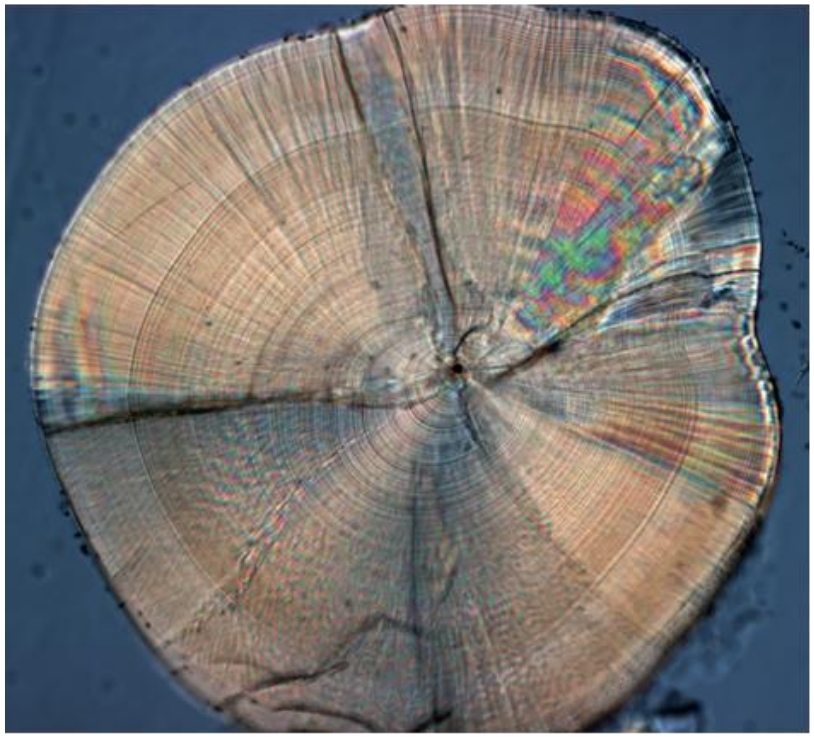
* Tiny calcium carbonate structures found in the inner ear of fish that are used for balance and hearing
* Information can be gained from the daily ring deposits, eg, age of the fish and timing of metamorphosis and sexual maturity

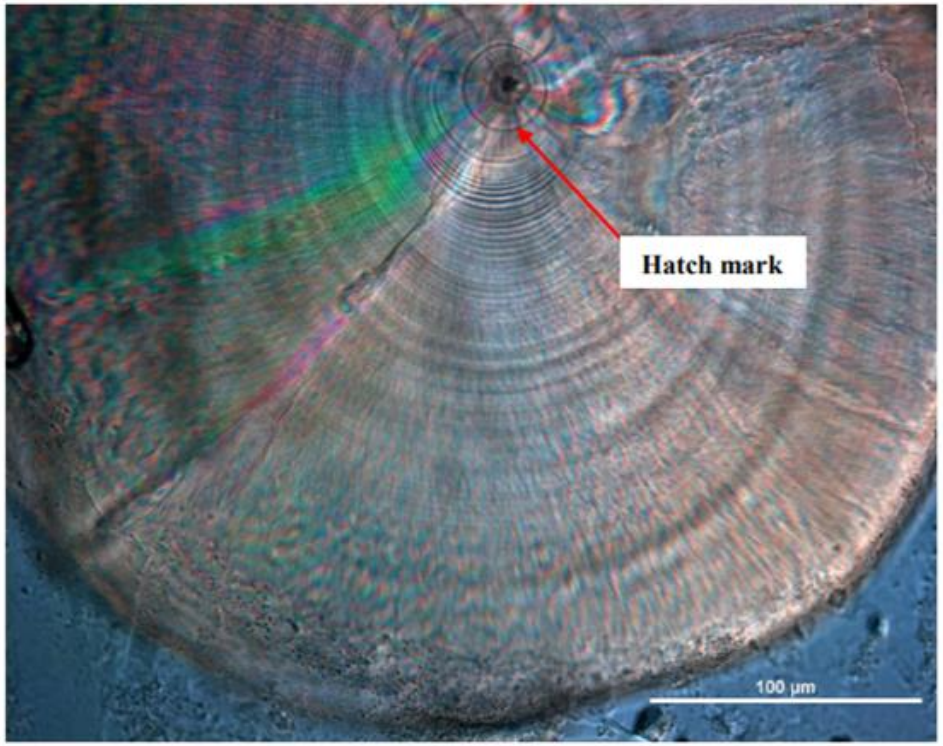


Inanga otoliths - whitebait and adult

Photo source : E. Egan

Growth rings





Inanga otoliths (Photo source: E. Egan)

What do we know already?

* Pingram carried out a study in 2004/05 in Waikare
* Appears to be a peak in hatching around June – August

* However, there are some limitations with this study…..

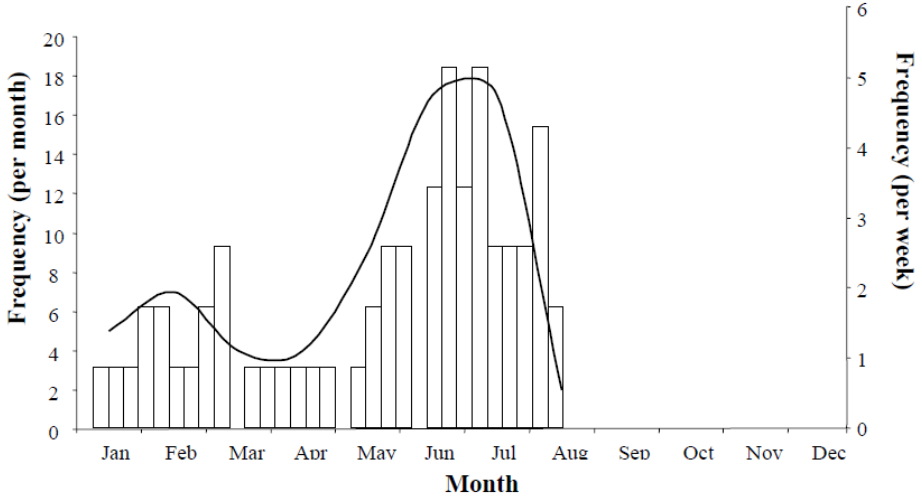


Figure 4.16. Frequency histogram of estimated hatch dates of 65 DLG. Bars represent weekly frequency of estimated hatch dates (left hand axis). The smoothed line represents monthly frequency of estimated hatch dates (right hand axis). Weeks and months are calculated for the 2004 calendar year from 1 January.

Source: M. Pingram

Limitations

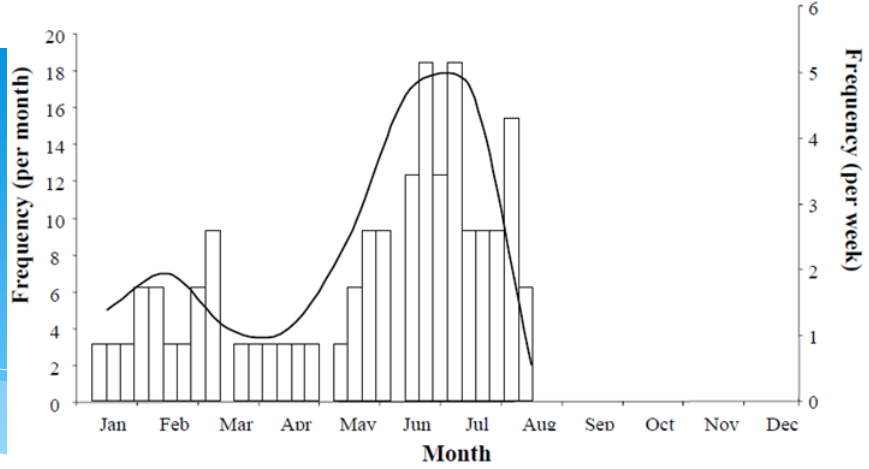


Figure 4.16. Frequency histogram of estimated hatch dates of 65 DLG. Bars represent weekly frequency of estimated hatch dates (left hand axis). The smoothed line represents monthly frequency of estimated hatch dates (right hand axis). Weeks and months are calculated for the 2004 calendar year from 1 January.

Source: M. Pingram

* Based on 65 fish in total
* Fish were only:
  * collected from the littoral zone using spotlighting
  * collected from Lake Waikare
  * in the size range of 25 – 49 mm
  * collected for 6 months of the year (Aug – Jan)
  * measured (not weighed)
* No observational data to relate samples to
* Raises the question **does this peak exist at this time because sampling was bias towards fish of a certain size, age, habitat or time of year?**

Aim & value of this research

Aims:

* To identify peak(s) in spawning
* To identify whether this peak coincides with environmental variables, eg, moon phase, rainfall/water level, water temperature

Value:

* Aid in conservation of the fish - identification of spawning sites and management of predators and habitat, timing and size of fish for translocations.
* Provide information on the ecology of DLG, - life history, eg, sexual maturity and life span, and habitat preferences at different life stages.

Photo source: M. Pingram

Proposed methods

* Collect fish from littoral and pelagic zones every 2 months from both Waikare and Taharoa
* Collect a range of sizes but predominately larval fish
* Sites and sampling effort will be constant
* Observations of fish seen will be accurately recorded, including shoal size and fish size
* Fish will be accurately weighed and measured
* Environmental variable data will be collected

What next?

* Approval from Taharoa Domain Committee (TDC)
* Finalise research design with input from key agencies
* Gain ethics approval for research
* Seek funding
* Start collecting fish
* Start analysing otoliths
* Report to TDC on initial results after first 6 months of sampling
* Review results after one year of sampling and report to TDC.
* Decision made on whether to continue collecting fish for a further 6 months – year.

Further potential research with fish and otoliths

* Inform further otolith work (otoliths can be found in the gut contents of trout for example)
* Genetic work
* Isotope work
* Identifying timing and extent of sexual maturity
* Life history

References

Campana, S. (2016) *The Campana lab.* Retrieved from http://uni.hi.is/scampana/ on 27/4/2018.

DOC (2007) *Draft Dune Lakes Galaxias Monitoring at Kai Iwi Lakes*. DOCDM-1087357

Egan, E. (2017) *Early life history of the amphidromous galaxiid inanga: disentangling the consequences for their migratory dynamics, population structure and adult growth.* A thesis submitted in partial fulfilment of the requirements for the Degree of Doctor of Philosophy in Ecology in the University of Canterbury, Christchurch, New Zealand.

Frost, A. (2018) *Investigation into the spawning habits of the Dune Lakes Galaxias (Galaxias sp.).* A report submitted in partial fulfilment of the requirements for the Bachelor of Applied Science (Biodiversity Management Major).

Pingram, M. (2005) *Ecology of freshwater fish in the littoral zone of Lake Waikare, Kai Iwi Lakes, Northland, New Zealand: for the conservation of the dune lake galaxias (Galaxias sp.).* A thesis submitted for the degree of Master of Science at the University of Otago, Dunedin New Zealand.

Rowe, D. et al. (2013) *Smelt monitoring in the Ohau Channel and Lake Rotoiti 2012-2013.* NIWA report prepared for Bay of Plenty Regional Council.

Acknowledgements

Contributors to this research proposal to date:

* NorthTec: Alex Going and Olly Ball
* DOC: Tom Drinan and Andrew Knock
* NIWA: Eimear Egan
* NRC: Carol Nicholson and Will Trusewich
* Te Roroa: Taoho Patuawa
* NZ Fish and Game: Rudi Hoetjes
* KDC: Mark Schreurs